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SCIENCE

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THE UNIVERSITY AND PUBLIC HEALTH¹

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"THE end of our foundation is the knowledge of causes, and secret motions of things; the enlarging of the bounds of human empire, to the effecting of all things possible." In these words Francis Bacon in "The New Atalantis" summed up the aims of what he called "Salomon's House" or the "College of the Six Days' Works." Plato dreamed of a society dominated by guardian philosophers; Sir Thomas More pictured a happy people practising an economic communism; Bacon imagined a sage civilization obedient to science; he had faith in social progress by research and education. He foreshadowed with astonishing vision the essential features of the modern university.

Salomon's House was lavishly equipped with buildings' apparatus and other facilities which would fill one of our faculties with joy, and a board of trustees or a legislature with consternation. There were caves, mines, lofty towers, lakes, hydraulic works, laboratories, orchards, gardens, kitchens, sound-houses, perspective houses, furnaces, mechanical shops, "dispensatories with shops of medicine," parks for animals "not only for view or rareness, but likewise for dissections and trials that thereby may take light what may be wrought upon the body of man." All this reads like the prospectus of a Western State University with a department of Agriculture and a standardized Medical School. The University of New Atalantis

¹ Abstract of an address delivered at the anniversary exercises of Johns Hopkins University, Saturday, February 22, 1919, by George E. Vincent, president of the Rockefeller Foundation.

was also a source of mechanical inventions which until the other day seemed to us fantastic. "We imitate also" says the complacent president of Salomon's House "flights of birds: we have some degree of flying in the air. . . . We have ships and boats for going under water . . . ". Here was a department of engineering to coax endowment or release appropriations!

But this is not a company to be interested in mere material things. The Hopkins tradition sets store not by buildings but by men. In the personnel and organization you will not be disappointed. Twelve traveling fellows were always abroad, exchange professors gathering information, books and apparatus. In residence, three men prepared catalogues of experiments; other three made lists of mechanical discoveries; a third triumvirate, known as "pioneers" undertook new investigations; then expert compilers assembled all results systematically. At this point there was a differentiation into applied science and pure research. On the one hand, fellows called "benefactors" worked out practical utilities for daily life. On the other, after general staff consultations, three advanced specialists planned further investigations which were carried out by the most skillful researchers called "inoculators." The work was crowned by "interpreters of nature" who "raise former discoveries into greater observations, axioms and aphorisms." We may smile at the elaborate division of labor and the quaint titles, but we realize that Queen Elizabeth's pliant courtier had firm hold upon the real substance of scientific research.

The College of the Six Days' Works was not wholly a cloistered center of pure investigation. It had a university extension department which maintained "circuits of visits of divers principal cities." Peripatetic lecturers published "such new, profit-

able inventions as we think good." There were specialists who gave advice about diseases, plagues, noxious insects, earthquakes, inundations and other disconcerting phenomena. These counsellors were apparently like our county-agricultural agents, and public health officials. This much is significant. Salomon's House dealt directly with the ultimate consumers of scientific information and expert advice. The popularizing middle man who purveys what a fastidious friend calls "Sunday Supplement Science" seems not to have been known in the "New Atalantis."

The ideals which Bacon cherished three hundred years ago are our guides to-day: the area of man's scientific interest worldwide; the search for truth in itself a noble end; the training of scholars a means at once of social inheritance and of leadership; the application of knowledge to the common, daily life an inspiring service; the diffusion of education a condition of progress. To promote these things is the purpose of the modern university. During the last fifty years in the United States rapid advance has been made in the material equipment of our universities. The inner intellectual and spiritual development has been a slower growth. The older institutions have made important contributions. To this honored university whose beginnings we celebrate on this anniversary this nation owes a debt of gratitude. Here a group of high-minded and devoted scholars established a tradition of pure research which has profoundly affected higher education in this country, and has been recognized beyond our borders. Salomon's Houses have been firmly founded in another Atalantis.

It is to be noted that university methods and spirit are gradually drawing under their influence almost every phase of education. Engineering training of the highest

type has either come under university control or is carried on in separate schools which have themselves adopted the ideals of higher education. The teaching of law as an inductive discipline under university auspices has steadily discredited the didactic methods of proprietary schools. Agriculture as an administrative art based upon a scientific knowledge of physics, chemistry and biology has had its chief development in the large state institutions which centralize public higher education for a whole commonwealth. Modern medicine has become so imbued with the university spirit and is so dependent upon scientific method and university resources that the independent, proprietary, practitioner-manned school is virtually a thing of the past. Dental education is advancing steadily toward university affiliation. Schools of education, business, journalism, training for social service, are all appearing as university departments.

The American university has stood well the searching tests of war. Undergraduates have given good account of themselves on land and sea. Alumni have put their technical training and administrative skill at the disposal of their country, and university professors have come to their own. They were found in every service. Physicists have invented submarine detectors and ear-drum protectors; chemists have created deadly explosives, noxious gases, new dyes; psychologists have tested aviators, classified recruits and devised methods of vocational selection; historians have prepared patriotic propagandist material, and are at the Peace Conference now fairly brimming with information geographical, racial, economic, political. University laboratory and clinical men have been a tower of strength to the medical service of the government. They have discovered new germs, produced sera and vaccines to protect the soldier; they have worked out new methods of sur-

gery; they have promoted camp sanitation and have improved hospital care. I shall never forget that May morning last year in France when General Finney—he was only a major then—showed me over the Hopkins Base Hospital which lay under the trees on the slope of a lovely valley. “Tell the people at Home,” he said, “that the boys will get a little better care here than they would if they were in Baltimore.” Could a loyal Hopkins man say more?

The American university, then, emerges from the war with a new sense of confidence and of social obligation. This does not mean that the university is self-satisfied. It recognizes that many changes must come. Entrance requirements, undergraduate studies, forms of organization, the status and salaries of college teachers, the rivalry between the types known as the “mere teacher” and the “research man,” the spirit and attitude of governing bodies, the conventionality of much graduate work—all these raise problems which must be dealt with. Nevertheless, the essential university ideals and methods have vindicated themselves. Especially is this true in the field of medicine. The university laboratories in charge of full-time workers with adequate equipment and assistance, the completely controlled hospitals and out-patient departments supplemented by community workers and visiting nurses, clinical research and teaching under full-time leadership, cooperation in investigation through staff conferences, the fostering of ideals of research, publication, training and social welfare, are the characteristic features of modern medicine which discards the labels and shibboleths of outworn schools and factions.

As was natural, public health policies and information about epidemics developed for the most part independently of universities. Medical men were to be sure from the outset concerned in public health pro-

cedures which had to do chiefly with quarantine, fumigation, water supplies and sewerage. Under pioneer conditions and in small communities there was little or nothing that could be called public health administration. With the growth of urban population more acute situations developed, but not until the discoveries of Pasteur did the knowledge exist upon which to base effective policies and procedures. Since then university laboratories have played an important part in the creation of the science of preventive medicine. It has been increasingly true that university-trained men have made contributions in this field. This is not to deny that conspicuous triumphs have been achieved by medical men whose training was not distinctively of the later university type. Their methods were based upon the results of research carried on in the true university spirit. Before the war there was widespread and increasing interest in public health, due to striking success in sanitation in Cuba and the Canal Zone, to the work of the U. S. Public Health Service, and of state and municipal officers, to the agitation maintained by numerous voluntary public health societies, and to demonstrations such as those carried out by the International Health Board in the control and prevention of hookworm infection.

The war has revealed facts, afforded opportunities and made possible demonstrations which have advanced the cause of public health in many ways. The large percentages of men rejected by the recruiting offices and draft boards caused surprise and alarm. The examination of millions of men afforded valuable data. Camp sanitation and health supervision of military zones offered unusual opportunities for controlled experiment. The handling of epidemics tested the resources and widened the experience of health officers. Hospital or-

ganization and administration were undertaken on a vast scale. The psychiatrists gained recognition for mental hygiene not only as a means of dealing with individual cases but as an organic part of public health, applicable to large groups. The policy adopted by the government with respect to venereal diseases and the vigorous campaigns against them carried on both at home and in France have resulted in statistical data and other records unique in the history of preventive medicine. The medical care of millions by salaried physicians and surgeons has been an object lesson in social medicine and has made more vivid the idea of health as an attribute of masses of men living a common life. Studies in munition and other warwork factories have dealt with occupational diseases, fatigues, night work, nutrition, labor of women and other phases of industrial hygiene. Communities, states and nation are ready as never before for a forward movement in public health.

All signs point to a rapid extension of public health activity in many fields. The federal, state and municipal bureaus and boards are in need of trained personnel. Voluntary associations call for experienced leadership. The outlook for industrial hygiene is bright. Employers are likely increasingly to regard the sanitation of factories and stores and the health supervision of employees as necessary features of sound business management. For such work specifically prepared types of officers, physicians, physical directors and nurses will be required. School hygiene bids fair to play a larger part in our educational system. All of these movements will create a demand for a great variety of specialists. The success of the whole national public health program which has been comprehensively outlined by the United States Public Health Service will depend quite as

much upon the securing of a properly trained personnel as upon the appropriation of adequate funds. The apprenticeship system of the past, the trusting to good fortune in finding medical men who have the imagination and energy to make themselves into public health officials will no longer serve our needs. Specialized agencies of training must be provided.

In response to this demand for a trained personnel for public health administration universities began some time ago to offer special courses. Pennsylvania took the lead in 1909, followed the next year by Harvard and the Massachusetts Institute of Technology which cooperated in establishing a curriculum. By 1915 eight other institutions were giving more or less attention to the training of public health officers. As was to be expected there was no uniformity in requirements or curricula, no standardizing of degrees. A premature agreement on these points would have been unfortunate. In every case the importance of practical work was recognized. For example at Harvard the opportunity to cooperate with Massachusetts towns and cities in making health surveys and in providing field experience for prospective health officials was wisely utilized. The new plans of the Harvard Medical School for research in occupational diseases, for demonstrations in industrial hygiene in connection with factories and stores, for the training of a special personnel and for the publication of a journal are significant of the university attitude toward the problems of public health.

It is in the keeping with the spirit of this university that a serious attempt should be made here to establish on an adequate basis the training of public health officers, laboratory men, specialists in epidemiology, field workers of all kinds, public health nurses and others. The School of Hygiene

and Public Health which opened its doors last October is a typical university-institution. While it is closely related to other divisions of the university, notably the medical school, the hospital, the engineering department, the courses in law and the social sciences, the new school is in no sense subordinate to any or all of these; it has its own individuality, its own faculty and student body, its own quarters and equipment, its own *esprit de corps*, its own professional point of view. It will have relations in the field with federal, state and local health administrations for purposes of practical training. It already counts among its leaders men of distinction in several fields of public health; it is seeking others who will round out the staff and man every phase of work which bears fundamentally on the problems of preventive medicine both in the laboratory and in the field.

The new school will not only provide thorough courses in the fundamental chemical, biological and medical subjects in their many specialized phases, but will lay stress upon vital statistics, upon sanitary engineering, upon the sociological aspects of public health, upon community surveys, upon the technique of administration. It is significant of the new attitude toward preventive medicine that from the outset attention is being given to the problems of nutrition. It does not seem prematurely philanthropic to establish, if possible, such basic norms for human beings as have been in some degree worked out for hogs and cattle! Prevention is being more and more positively interpreted into a better standard of living, in terms of working conditions, housing, food, exercise, recreation, sociability and happiness. The field of industrial hygiene has great possibilities. A modern school of public health will inevitably be compelled to widen its scope and to extend its interests with the develop-

ment of the theory and practise of social welfare. A fascinating vista opens before men and women of trained intelligence, controlled imagination, and social loyalty.

There are problems with respect to which the new school will be expected to furnish light and leading. One of these is the definition of the functions and the training of the public health nurse. Is she expected to be able to practise medicine or is she merely the long arm of the physician? Should she be a graduate nurse of a regular hospital training school with additional education and experience in sociology and field work? Or should she be a new kind of social worker, a "health visitor" without hospital training? Can a new course be arranged to include a special form of hospital experience, courses in preventive medicine, statistics, sociology, administrative law and practical field work under supervision? If so, how many years should be set aside, what sort of preliminary training should be required and how can existing agencies be induced to cooperate in providing a new curriculum? Questions like these are pressing for answer. Attempts are being made to reach a consensus. Several groups of institutions are anxious to make the experiment. Here is an opportunity to take the lead in establishing a normal school for public health nursing which could help to supply teachers and superintendents for the nurses' training centers which seem likely to develop in various parts of the country.

You may not have forgotten that the university of New Atalantis engaged directly in extension and publicity work. It went to the popular circuit with practical information. What is the duty of the modern university in this regard? The academic and the advertising minds are not congenial. The former by scrupulously logical means slowly reaches tentative con-

clusions: the latter dogmatically "puts things across" and "sells an idea" to the public. Thus patriotic advertising men during the war rallied to the aid of the government: they "sold" the war, liberty bonds, the Red Cross, Thrift Stamps to the American people. That is, by infectious slogans, adhesive shibboleths, vivid posters, and "four-minute" hypnosis, certain motor ideas were fixed and held in millions of minds until action was secured. All this is apt to fill the sensitive soul of the scientifically-minded man with a kind of protesting dismay. He sees ready-made conclusions dramatically impressed upon a whole nation. The fact that he agrees for the most part in the conclusions and welcomes the outcome, does not reconcile him to the method. He is quite sure that it would be impossible for a university to do this sort of thing.

One can understand this feeling and yet realize that the progress of public health in a democracy depends directly upon "selling the idea" to the public. The experience of various state boards and voluntary societies in this country; the public health campaigns of the Red Cross and the International Health Board in France have proved that vivid and picturesque publicity, verbal and visual, accomplishes valuable results. Shall work of this sort be left to independent advertising experts and popularizers, or shall universities recognize the art of applied mass-psychology, and consciously train men and women to organize and administer campaigns of popular education in preventive medicine? One can imagine complete collections of posters and other materials, prize competitions for new devices and propagandist literature, training in extempore speaking on various phases of public health—all conducted under the auspices of a school of public health. I merely raise the question. I am

too good a psychologist to attempt to "sell" this idea to an academic audience.

In a time when many things seem uncertain, and there are some reasons for grave anxiety, hope and courage are found in the idea of the university, a center of research, of scientific idealism, of professional pride, and of loyalty to the community entering the field of public health. Here men and women are to be trained to serve their fellows, to help to bring in a better social order in which health shall be interpreted in ever wider and nobler ways. We cling still to the dream of Francis Bacon, the vision of a people served by a brotherhood of scholars who give themselves gladly that knowledge may enrich and bless the lives of all. May the American university strive always to deserve the verdict of the citizens of the New Atalantis upon Salomon's House, "the noblest foundation, as we think, that was ever upon the earth, and the lantern of this kingdom."

GEORGE E. VINCENT

THE MEASUREMENT AND UTILIZATION OF BRAIN POWER IN THE ARMY, II.

Military Applications of Mental Ratings.

—The sample distribution curves of Fig. 1 indicate the value of mental ratings for the identification and segregation of different kinds of military material. The illiterate group of this figure was examined by means of Beta, all other groups by means of Alpha.

Comparison of various military groups distinguished from one another by actual attainment in the service shows that the psychological tests discriminate between these groups with definiteness. This point may be illustrated by reference to the percentages of men of different groups making A and B grades in Examination Alpha: officers, 83.0 per cent.; officers' training

school candidates, 73.2 per cent.; sergeants, 53.4 per cent.; corporals, 39.7 per cent.; literate privates, 18.8 per cent. The comparison of measures of central tendency reveals equally striking differences. Moreover, within the officer group itself significant differences appear for different branches of the service.

The relation of success or failure in officers' training schools to intelligence ratings is exhibited by Fig. 2, in which it is to be noted that elimination through failure in the school increases rapidly for ratings below C+. Of men rating above C+, 8.65 per cent. were eliminated; of those below C+, 52.27 per cent. The data for this figure were obtained from three schools with a total enrollment of 1,375 men.

Similarly Fig. 3 shows the relation between success or failure in non-commissioned officers' training schools and intelligence ratings. The elimination increases rapidly for grades below C+. Of men rating above C, only 18.49 per cent. were eliminated; of men rating below C, 62.41 per cent. The results presented in this figure were obtained from four schools with a total enrollment of 1,458 men.

Increasingly extensive and effective use has been made of the psychological rating as an aid in the selection of men for officers' training schools, non-commissioned officers' training schools and other lines of training or service which require special ability. It has been convincingly demonstrated that the data of psychological examinations can readily be used to diminish the necessary elimination during training and thus to increase the efficiency of the schools.

The extreme differences in the intellectual status of army groups are fairly indicated by Fig. 4, which presents the data for groups whose military impor-